

Cost-benefit analysis of bee Jay Bakau resort probolinggo mangrove ecotourism management

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ABSTRACT

Mangrove forest ecosystems provide direct and indirect benefits to humans yet require costs in their utilization. If the benefits provided outweigh the costs incurred, it indicates that mangrove forest ecosystems are in sustainable condition. Thus, it is necessary to have mangrove forest management to provide sustainable benefits to the community. This research aims to analyze the costs and benefits of Bee Jay Bakau Resort Ecotourism, Probolinggo. The research method is quantitative with the Cost-Benefit Analysis approach. Bee Jay Bakau Resort (BJBR) is a mangrove ecotourism area located in Mangunharjo Village, Mayangan District, Probolinggo City, East Java. From a total of 82 hectares of mangrove forests in Mangunharjo Village, BJBR has the management rights of 89,490 m². BJBR ecotourism management has a positive impact on the sustainability of mangrove ecosystems because the benefits outweigh the cost of 353,867,253 IDR/year.

Key words : *Ecotourism, Mangrove forests, CBA, BJBR*

Introduction

Natural resources in coastal areas are divided into three types, i.e. coral reefs, mangroves forests, and seagrass beds. Mangrove forests are a forest formation filled with littoral plants and affected by tides with anaerobic soil conditions. Mangrove forests do not depend on climate but generally grow well in protected coastal areas, such as deltas and estuaries (Pariyono, 2006).

Mangrove forest ecosystems provide direct and indirect benefits to humans yet require costs in their utilization. If the benefits provided outweigh the costs incurred, it indicates that mangrove forest ecosystems are in sustainable condition. Thus, it is necessary to have mangrove forest management to provide sustainable benefits to the community. According to (Hakim *et al.*, 2017), tourism is one of the significant tools to enhance and support environmental conservation, including mangrove ecosystems in

tropical regions. In East Java, tourism has the potential to become a mangrove conservation strategy. In mangrove-based tourism activities, the community is actively involved in preserving mangroves, starting tourism programs, and promoting mangroves as an alternative natural tourism destination.

BJBR mangrove ecotourism was established due to the concern of three friends named Benjamin Mangitung, Justinus Tan, and Juda Mangitung who noticed mangrove forests in Mangunharjo Village with damaged conditions and lots of landfills. This condition causes unpleasant odors in the mangrove areas, causing them to be often called as "*kali banger*" by the surrounding community or "*Sungai Bau* (Smelly River)" in Indonesian. Therefore, the three friends finally established mangrove ecotourism named after their names' combination. BJBR ecotourism's vision is "Turning waste into gold" and has the aim of preserving mangrove forests and utilizing mangrove forest ecosystems in an

environmentally friendly manner. Mangrove forest management by BJBR has a positive impact on the sustainability of mangrove forest ecosystems. The benefits from the mangrove management are ecotourism, catches, and other economic benefits for the surrounding community. According to Naik and Selverajan, (2013), measurement of ecotourism costs and benefits is needed to increase potential and conservation.

Cost-benefit analysis is an approach that emphasizes the effectiveness aspects in which the existing development projects must consider the benefits resulting from the project development and the estimated costs to be incurred to obtain the desired benefits (Mutmainah, 2016). The study at Tampa Bay resulted in the successful management of coastal ecosystems due to collaboration between scientists, managers, communities, and public institutions to balance environmental and economic costs and benefits (Russell and Greening, 2015). Mexico having coastal wetlands of 4,243,137 ha produced a Net Present Value of mangrove carbon offsets of \$5822.71, broad-leaved marshes of \$7958.86, cattail marshes of \$5250.33, and forested wetlands of \$8369.41 per hectare, during a 30-year-carbon offsets contract (González *et al.*, 2017). Calculation value of Cost-Benefit Analysis of mangrove forests on Bee Jay Bakau Resort ecotourism is used to measure the benefits of managing initially contaminated and damaged areas. BJBR ecotourism managed through private ownership rights also provides an opportunity for the community to participate in the management and utilization of mangrove ecosystems. With this research, it is expected that the sustainability of mangrove forests and mangrove forest ecosystems could be maintained and the community will increasingly realize the benefits of mangrove forest sustainability. This research aims to analyze the costs and benefits of Bee Jay Bakau Resort Ecotourism, Probolinggo.

Literature Review

Ecotourism is the nature-based tourism which means protection of nature as well as enjoying it (Islam *et al.*, 2011). Ecotourism is defined as responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education (TIES, 2019). Ecotourism in Bangladesh has a positive economic, environmental, and cultural impact. The revenue

generated by tourism activities has been beneficial to the country, the private sector, and the local community. As far as the environment is concerned, ecotourism has reduced the dependence of the local people on the Sundarbans, and to that extent, it has contributed to environmental preservation. The positive impact of ecotourism on culture. The positive impacts of ecotourism on culture include local cultural preservation, promotion of cross-cultural understanding, and local handicraft production (Islam *et al.*, 2011).

Cost-Benefit Analysis (CBA) consists of the Net Present Value (NPV) or the present net value and the Benefit-Cost Ratio (BCR) or the comparison between discounted benefits and costs (Massiseng, 2013). A cost-benefit analysis was conducted to estimate the costs that the community would likely incur as a function of mangrove forest degradation in Tana Delta, Kenya. The analysis accounted for the total benefits and costs. The total benefits include goods and services that the coastal community acquires from mangroves. The total costs are defined as the costs incurred in the daily management, mangrove conservation, and the forgone benefits for mangrove conservation (Karanja and Saito, 2017). The benefits of the restoration and preservation of the Tampa Bay ecosystems provided an alternative to minimize costs (Russell and Greening, 2015). The initial utilization of mangrove ecosystems in Barru Regency was as shrimp ponds of 353.49 ha, milkfish ponds of 816.46 ha, polyculture ponds of 1,423.48 ha, and mangrove forests of 152.54 ha. Alternative analysis of mangrove forest utilization with 6 assumptions using Cost Benefit Analysis with a discount rate of 12% showed the most efficient alternative socially, economically, and ecologically was the utilization alternative III where shrimp ponds of 353.49 ha, milkfish ponds of 816.46 ha, polyculture farm of 0 ha, and mangrove forests of 1,576.02 ha with a net present value (NPV) of 41,973,889,970 IDR (Massiseng, 2013).

Research Methods

This research uses the quantitative method. According to (Yusuf, 2017), a quantitative approach views human behavior as predictable, social reality, objective, and measurable. Therefore, the use of quantitative research with a valid and reliable instrument and suitable and appropriate statistical analysis causes the achieved research results not to deviate

from the actual conditions. The type of research is descriptive quantitative. Data collection technique used interviews, observation, and documentation. Sampling technique used purposive sampling with judgment sampling because the research location was managed from damaged and contaminated conditions to mangrove ecotourism providing benefits.

Cost-benefit analysis is used to assess the ecological and cultural costs and benefits and its contributions to the local community and the environment (Naik and Selverajan, 2013). Calculation of Cost-Benefit Analysis (CBA) was conducted by calculating the Net Present Value (NPV) to analyze the direct benefits of BJBR ecotourism activities. A business is feasible to be economically developed if the NPV value is > 0 (Setiyowati *et al.*, 2016); (Daujanov *et al.*, 2016); (Hakim, 2016) and (Purwanti *et al.*, 2018). It is stated that the NPV is the difference between the costs and the benefits of conservation implementation resulting in the net present value of benefits. The NPV formula is as follows:

$$NPV = \sum_{i=1}^t \frac{NB_i}{(1+i)^i}$$

The assumptions used in NPV calculation included:

1. Mangrove forest area is 89,490 m²
2. The analysis period is 30 years according to the length of BJBR land lease
3. The loss of mangrove benefits becomes the loss costs for mangrove forest management (Setiyowati, Supriharyono and Triarso, 2016)
4. The discount rate used in the present calculation is 10% (Tran and Tinh, 2013).

Results and Discussion

Characteristics of Bee Jay Bakau Resort Ecotourism in Probolinggo City

Bee Jay Bakau Resort (BJBR) is a mangrove ecotourism area located in Mangunharjo Village, Mayangan District, Probolinggo City, East Java. From a total of 82 hectares of mangrove forests in Mangunharjo Village, BJBR has the management rights of 89,490 m² with a 30-year management period from the year the BJBR mangrove ecotourism was managed in 2012 (DKP Probolinggo, 2014). The management rights agreement is contained in the

memorandum of understanding between the management of BJBR mangrove ecotourism and DKP Probolinggo as the party in charge of the mangrove forest management from the regional government of Probolinggo. Regarding permits for the utilization of various economic fauna by the surrounding community within Bee Jay Bakau Resort mangrove ecotourism management area, the management, in this case represented by the manager of BJBR ecotourism, does not prohibit the community to search for economic organisms in the ecotourism area with the condition that the community should maintain the sustainability of mangrove forests.

Indonesia has 202 types of mangrove species. The zone closest to the sea is dominated by *Avicennia spp*, *Sonneratia spp*, *Rhizophora spp*, *Bruguiera spp*, and mangrove associates (Muzaki *et al.*, 2012). BJBR ecotourism area has 4 mangrove species out of a total of 6 mangrove species composing mangrove vegetation in Mangunharjo Village. From the results of observations and mangrove identification, the four mangrove species include *api-api* (*Avicennia alba*), white mangrove (*Avicennia marina*), black mangrove (*Rhizophora mucronata*), and large-leafed mangrove (*Bruguiera gymnorhiza*).

BJBR ecotourism produces benefits in the form of the number of tourist visits. In September 2017 to August 2018, the number of tourists was 168,779 people or 14,065 people/month, causing the tourist visits generated benefits in the form of revenue. Organisms that can be utilized by the surrounding community are mangrove crabs (*Scylla serrata*), blue swimmer crabs (*Portunus pelagicus*), oysters (*Crassostrea*), and green mussels (*Mytilus viridis*) (DKP Probolinggo, 2014). Mangrove crabs exploit the mangrove ecosystems as nursery grounds and feeding grounds. The organisms' foods include detritus, carcasses, mollusks, and other smaller crabs. The density of mangrove crabs in Mangunharjo Village is 4 individuals/25m². Blue swimmer crabs live in clear water with a sandy substrate. They can be found in BJBR mangrove ecotourism area in Mangunharjo Village, Probolinggo with a density of 4 individuals/m². Oysters live by attaching themselves to solid substrates such as rocks. The density of oysters in Mangunharjo Village is 8 individuals/m². Green mussels live by attaching themselves to solid substrates such as mangrove trees and rocks by means of threads (byssus). The high economic value of green mussels causes over fishing

and decline in green mussels catch. The density of green mussels in Mangunharjo Village is 1 individual/25 m².

The community conducts fishing activities once or twice when the sea water recedes in the morning and afternoon. Fishing in the BJBR mangrove forest area is generally in groups led by BD with 8 group members. The tools used are buckets, machetes, nets, and fishing rods. Crab density occurring at high tide, which is caught by nets and fishing rods, is strongly influenced by mangrove vegetation composition. Blue swimmer crab density occurring at high tide, which is caught by nets and fishing rods, is strongly influenced by mangrove vegetation composition. The tool used to catch the oyster is machetes. A good and safe way for mangrove trees in getting oysters is by dredging oysters attached to mangrove trees using a machete in a vertical direction from top to bottom without cutting the mangrove trees. The tool used to catch green mussels is quants/bamboo net.

Benefits of Bee Jay Bakau Resort Ecotourism in Probolinggo City

Mangrove forests in South Sulawesi have benefits for catches (fish, crabs, shrimp), fish farming, firewood collection, charcoal production, and Nypa palm crafting (Malik *et al.*, 2015). BJBR ecotourism revenues are obtained from the number of tourist visits, lodging, restaurants, and other businesses with an average of 2,497,760,000 IDR per year. Mangrove crab catch is 0.5 kg/week/person, making 208 Kg of mangrove crab catch for 1 year with the selling price of 60,000 IDR/Kg. Revenue from mangrove crab

catch is 12,480,000 IDR. Blue swimmer crab hunters get 1.5 Kg/week/person or 624 Kg/year with the selling price of 40,000 IDR/kg. Revenue from blue swimmer crab catch is 24,960,000 IDR. Oyster hunters get 6 kg/week/person or 2,496 Kg in one year with the selling price of 40,000 IDR/Kg. Revenue from oyster catch is 99,840,000 IDR. Green mussel hunters get 3 kg/week or 1,248 kg/year. With the selling price of 15,000 IDR/kg, revenue from green mussel catch in 1 year is 18,720,000 IDR.

Costs of Bee Jay Bakau Resort Ecotourism in Probolinggo City

The activity of mangrove ecosystem organism utilization and mangrove ecosystem preservation need costs. Costs to restore the vegetative cover and ecological functions of a mangrove forest range from USD\$225/ha to USD\$216,000/ha or even more than USD\$ 500.000/ha (Lewis, 2001). Costs to develop mangrove ecotourism in Sebus Village, Sambas Regency was 88,465,178.42 IDR. Periodically incurred operating costs during ecotourism is 77,040,000 IDR per year (Istiqamah *et al.*, 2014). Costs needed for BJBR ecotourism activities include maintenance, construction, employee salaries, electricity, water, reforestation, waste deodorizing materials, and fishing.

Assumptions for costs incurred each year include: management rights of 20,000,000 IDR, facilities development and construction plans of 1,000,000,000 IDR, operating cost of 1,600,000,000 IDR, electricity usage cost of 80,000,000 IDR, water usage cost of 20,000,000 IDR, waste deodorizing material cost of 12,500,000 IDR, fishing operating

Table 1. Cost-Benefit analysis of BJBR Ecotourism with a dr of 10% for 30 years

| No | Item | Benefits (IDR) | Costs (IDR) |
|----|------------------------------------|----------------|----------------|
| 1 | BJBR Land Lease | | 208,538,289 |
| 2 | BJBR Development | | 10,426,914,467 |
| 3 | BJBR Revenue | 35,319,254,819 | |
| 4 | BJBR Operating Costs | | 15,083,063,147 |
| 5 | Green Mussels | 176,471,839 | |
| 6 | Oysters | 941,183,140 | |
| 7 | Blue Swimmer Crabs | 235,295,785 | |
| 8 | Mangrove Crabs | 117,647,893 | |
| 9 | Fishing Operating Cost | | 196,079,821 |
| 10 | Reforestation | | 141,403,717 |
| 11 | River Waste Deodorizing Material | | 117,836,431 |
| | Total | 36,789,853,475 | 26,173,835,872 |
| | Net value of benefits for 30 years | 10,616,017,603 | |
| | Average net value of benefits/year | 353,867,253 | |

cost of 20,800,000 IDR, and reforestation cost of 15,000,000 IDR. Thus, the total costs of all activities in the BJBR area for one year is 2,768,300,000 IDR.

Cost-Benefit Analysis of Bee Jay Bakau Resort Ecotourism in Probolinggo City

Preservation of BJBR mangrove forest ecotourism provides direct benefits in the form of green mussels, oysters, blue swimmer crabs, and mangrove crabcatch. The community also benefits from the existence of ecotourism because it provides employment for the surrounding community. The overall present value of benefits for 30 years with a discount rate of 10% is 36,789,853,475 IDR, while the present value of costs of BJBR ecotourism management and utilization activities is 26,173,835,882 IDR. The difference in benefits and costs results in the net present value of benefits of 10,616,017,603 IDR/30 years or 353,867,253 IDR/year. It shows that the sustainability of BJBR mangrove forests provides greater benefits for the surrounding community. The higher value of benefits indicates the more sustainable mangrove forests. (Purwanti, Primyastanto, & Fattah, 2018) state that the cost-benefit analysis of a business resulting in a positive value and higher than 0 (zero) could mean that the sustainability of mangrove forests provides higher benefits than costs.

Conclusion

The conclusions of this research include Bee Jay Bakau Resort (BJBR) is a mangrove ecotourism area having management rights from the regional government of Probolinggo. The management rights still provide an opportunity for the community to utilize organisms in the mangrove areas in a sustainable manner. BJBR ecotourism provides benefits for the management and the community. The net value of benefits of BJBR ecotourism activities results in a positive value, making the benefits of BJBR ecotourism management are higher for the surrounding community.

Suggestions of this research are that the government and the BJBR management should enhance cooperation for the sustainable mangrove forest management with the government and the community in the form of conservation and development that considers environmental, economic, and social sustainability. Besides, it is necessary to do a simulation of the cost and benefit calculation between the

ecotourism area and mangrove forest to produce the ideal area in the utilization of mangrove ecosystems.

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